Appendix I

Water and Wastewater Calculations

CHANDLER RANCH SPECIFIC PLAN WASTEWATER FLOW PRELIMINARY ANALYSIS

	Area Number	Acreage	Landuse	Density	Max DU	Population	ADWF gpcpd	ADWF gpd/acre	Equivalent Dwelling Units	ADWF gpd	PDWF (gpd)	PWWF (gpd)
	1	64.0	Residential	1	50	135	100	N/A		13,500	28,350.00	35,100
	2a	26.9	Residential	1	37	100	100	N/A		9,990	20,979.00	25,974
	2b		Apartments	8	24	65	100	N/A		6,480	13,608.00	16,848
	3a	59.5	3 Pack	6	138	373	100	N/A		37,260	78,246.00	96,876
	3b		Residential	2	50	135	100	N/A		13,500	28,350.00	35,100
	4	10.0	Aquatic Center	N/A	N/A	N/A	N/A	880	33	8,800	18,480.00	22,880
	5	3.0	Public Facilities	N/A	N/A	N/A	N/A	880	10	2,640	5,544.00	6,864
	6	33.7	6 Pack*	8	190	513	100	N/A		51,300	107,730.00	133,380
	7	54.5	Residential	4	141	381	100	N/A		38,070	79,947.00	98,982
	8	46.2	Residential	3	100	270	100	N/A		27,000	56,700.00	70,200
	9	42.3	Residential	4	95	257	100	N/A		25,650	53,865.00	66,690
Alternative 5	10	18.2	School	N/A	N/A	N/A	N/A	880	59	16,016	33,633.60	41,642
	11	7.7	Residential	4	31	84	100	N/A		8,370	17,577.00	21,762
	12	30.6	Residential	6	205	554	100	N/A		55,350	116,235.00	143,910
	13	20.6	Residential	4	66	178	100	N/A		17,820	37,422.00	46,332
	14	25.2	Residential	6	83	224	100	N/A		22,410	47,061.00	58,266
	15	0.7	Residential	9	NC	NC	NC	NC		-	-	-
	16	12.3	Residential	9	139	375	100	N/A		37,530	78,813.00	97,578
	17	9.0	Residential	6	90	243	100	N/A		24,300	51,030.00	63,180
	18a	4.0	Retail/Office	N/A	N/A	N/A	N/A	880	13	3,520	7,392.00	9,152
	18b	7.0	Retail/Office	N/A	N/A	N/A	N/A	880	23	6,160	12,936.00	16,016
	19a	3.1	Commercial	N/A	N/A	N/A	N/A	880	10	2,728	5,728.80	7,093
	19b	3.5	Commercial	N/A	N/A	N/A	N/A	880	11	3,080	6,468.00	8,008
	19c	3.4	Commercial	N/A	N/A	N/A	N/A	880	11	2,992	6,283.20	7,779
	Totals	**475.4**			**1439**	**3885**				**425,666**	**893,898.60**	**1,106,732**

* Reduced from 222 to 190 units to account for area 1-10 restriction of 825 units

CHANDLER RANCH SPECIFIC PLAN WASTEWATER FLOW PRELIMINARY ANALYSIS

Trunk Line Analysis for Alt #5 (Airport Basin)

Union Road Connection (Airport)			Min Pipe Slope	Pipe Size*
AREAS	PDWF (gpm)	PWWF (gpm)		
A7 =	55.52	68.74	0.002	8
A6+A7 =	130.33	161.36	0.002	8
A5+A6+A7 =	134.18	166.13	0.016	8
A5+A6+A7+A19a+A18a =	178.82	221.39	0.002	12
Union Road Connection (Airport)				
AREAS	PDWF (gpm)	PWWF (gpm)		
A4 =	12.83	15.89	0.002	8
A10 =	23.36	28.92	0.002	8
A4+ A10 =	36.19	44.81	0.002	8
Gilead Lane Connection (Airport)				
AREAS	PDWF (gpm)	PWWF (gpm)		
A3a =	54.34	67.28	0.002	8
Golden Hill Road Connection (Airport)				
AREAS	PDWF (gpm)	PWWF (gpm)		
A3b =	19.69	24.38	0.002	8
A1 =	2.95	3.66	0.002	8
A1 + A3b =	22.64	28.03	0.002	8

* Based on 50% d/D (See Attached Pipe Calculator)
** Choose 10"

CHANDLER RANCH SPECIFIC PLAN WASTEWATER FLOW PRELIMINARY ANALYSIS

Trunk Line Analysis for Alt #5 (Bolen & Meadow Lark Basin)

Golden Hill Road Connection (Bolen)

AREAS	PDWF (gpm)	PWWF (gpm)		Min Pipe Slope	Pipe Size*	Total Zone PDWF	Total Zone PWWF	Total Trunk PDWF (gpm)	Total Trunk PWWF (gpm)
A1 =	9.84	12.19		0.002	8				
A2a =	7.28	9.02		0.002	8				
A1 + A2a+2b =	26.58	32.91		0.002	8	26.58	32.91		

West Tract 2281 Connection (Bolen)

AREAS	PDWF (gpm)	PWWF (gpm)							
A2a =	7.28	9.02		0.002	8	7.28	9.02		

East Tract 2281 Connection (Bolen)

AREAS	PDWF (gpm)	PWWF (gpm)							
A1 =	9.84	12.19		0.002	8				
A8 =	55.52	68.74		0.002	8				
A1 + A8 =	65.36	80.93		0.002	8	65.36	80.93		
								99.23	**122.85**

Sherwood Road Connection (Meadow Lark)

AREAS	PDWF (gpm)	PWWF (gpm)							
A8 =	39.38	48.75		0.002	8				
A9 =	5.61	6.95		0.002	8				
A8+A9 =	44.99	55.70		0.002	8				
A8+A9+A12 =	125.70	155.63		0.01	10				
A8+A9+A11+A12 =	137.91	170.75		0.005	10	137.91	170.75		

Fontana Road Connection (Meadow Lark)

AREAS	PDWF (gpm)	PWWF (gpm)							
A9 =	31.80	39.37		0.002	8				
A9+A14 =	64.48	79.83		0.002	8				
A16+A17 =	90.17	111.64		0.002	8				
A9+A14+A16+A17 =	154.65	191.47		0.012	8				
A9+A13+A14+A16+A17 =	180.63	223.64		0.005	8 or 10	180.63	223.64		
								318.54	**394.39**

* Based on 50% d/D (See Attached Pipe Calculator)

CHANDLER RANCH WATER ORCHARD BOOSTER PUMP STATION ANALYSIS

11/14/2005

CHANDLER RANCH SPECIFIC PLAN WATER DEMAND PRELIMINARY ANALYSIS

	Area Number	Acreage	Landuse	Density	Max DU	Population	Demand (gpcpd)	Demand (gpd/acre)	Equivalent Dwelling Unit	Average Day Demand (gpd)	Peak Hour Demand (gpm)	Peak Day Demand (gpd)
	1	64.0	Residential	1	50	135	260	N/A		35,100	107	73,710
	2a	26.9	Residential	1	37	100	260	N/A		25,974	79	54,545
	2b		Apartments	8	24	65	260	N/A		16,848	51	35,381
	3a	59.5	3 Pack	6	138	373	260	N/A		96,876	296	203,440
	3b		Residential	2	50	135	260	N/A		35,100	107	73,710
	4	10.0	Aquatic Center	N/A	N/A	N/A	N/A	1800	26	18,000	55	37,800
	5	3.0	Public Facilities	N/A	N/A	N/A	N/A	1800	8	5,400	17	11,340
	6	33.7	6 Pack *	8	190	513	260	N/A		133,380	408	280,098
	7	54.5	Residential	4	141	381	260	N/A		98,982	302	207,862
	8	46.2	Residential	3	100	270	260	N/A		70,200	215	147,420
	9	42.3	Residential	4	95	257	260	N/A		66,690	204	140,049
Alternative 5	10	18.2	School	N/A	N/A	N/A	N/A	1800	47	32,760	100	68,796
	11	7.7	Residential	4	31	84	260	N/A		21,762	66	45,700
	12	30.6	Residential	6	205	554	260	N/A		143,910	440	302,211
	13	20.6	Residential	4	66	178	260	N/A		46,332	142	97,297
	14	25.2	Residential	6	83	224	260	N/A		58,266	178	122,359
	15	0.7	Residential	9	NC	NC	NC	NC			-	-
	16	12.3	Residential	9	139	375	260	N/A		97,578	298	204,914
	17	9.0	Residential	6	90	243	260	N/A		63,180		
	18a	4.0	Retail/Office	N/A	N/A	N/A	N/A	1800	10	7,200		
	18b	7.0	Retail/Office	N/A	N/A	N/A	N/A	1800	18	12,600		
	19a	3.1	Commercial	N/A	N/A	N/A	N/A	1800	8	5,580		
	19b	3.5	Commercial	N/A	N/A	N/A	N/A	1800	9	6,300		
	19c	3.4	Commercial	N/A	N/A	N/A	N/A	1800	9	6,120	19	12,852
	Totals	**485.4**			**1439**	**3885**				**1,104,138**	**3,083.91**	**2,119,484**

* Reduced from 222 to 190 units to account for area 1-10 restriction of 825 units

Note: Residential Water Demand was adjusted from 200 gpcpd to 260 gpcpd per the direction of the Paso Robles Public Works Department

CHANDLER RANCH WATER ORCHARD BOOSTER PUMP STATION ANALYSIS

11/14/2005

	Max. Day Demand (gpm) (1.)	Chandler Ranch Population	Regulatory Storage (MG) (2.)	Emergency Storage (MG) (3.)	Fire Storage (MG) (4.)	Total Required (MG)	
*	971	3885	0.4080	0.5828	0.2040	**1.195**	
**		3886	0.75	0.58	0.36	**1.690**	←

** Per Boyle Memo Dated March 3, 2005 to John Falkenstien (Method C)

* (1.) .25gpm/c
(2.) (1.5-1.0) x MDD (gpm) x 14hrs x 60 min/hr
(3.) 50 gpd/person for 3 days
(4.) Chandler Ranch Population/Estimated Tot. Pop (27,420) x 4,000 gpm for 6 hrs

Well Production Requirements			
Number of Wells		3	
Pump Capability		650	gpm
Runtime		12	hours
Daily Volume per well		468,000	gallons
		1.44	acre-feet
Total Daily Production		1,404,000	gallons
		4.31	acre-feet

CHANDLER RANCH WATER ORCHARD BOOSTER PUMP STATION ANALYSIS

11/14/2005

ORCHARD BUNGALOW EXPANSION AREA ANALYSIS				
Area Number	**Units**	**Population**	**Average Day Demand (gpd)**	**Peak Hour Demand (gpm)**
1	50	135	35,100	107
3b	50	135	35,100	107
7	141	381	98,982	302
8	87	235	61,074	187
9	84	226	58,687	179
Totals	**412**	**1,111**	**288,943**	**883**
Peak Hour Demand (gpm) per Dwelling Unit				*2.15*

Current Booster Pump Station Facility Data (1)	
Capacity (gpm)	1700
Existing Peak Use (gpm)	1300
Averge Use (gpm)	500
Excess Capacity (gpm)	400
# of Units that may be served prior to expansion	**186**

(1) Information provided by Public Works 7/04

MEMORANDUM

TO: Bob Lata March 24, 2005

FROM: Christopher Alakel, PE

SUBJECT: Storage and Production Requirements for Chandler Ranch

The City of Paso Robles has requested that Boyle prepare a memo estimating storage and production needs for the planned Chandler Ranch development. The assessment is to include water service for 1439 dwelling units and 23.2 acres of commercial land uses. The 1995 Water Master Pan was referenced as part of this evaluation. It should be noted that the City is currently updating their Water Master Plan. As part of that effort the information and methodology used by the City to assess storage and production requirements (i.e. use factors, per capita consumption, peaking factors, etc.) may be updated and revised.

Assessment Criteria and Assumptions:

The 1995 Water Master Plan was used as a basis for the following:

- Peaking Factors: Max day demand (MDD) = 2.2 x average day demand (ADD)
- Residential Duty Factors: Residential consumption is approximately 80% of total consumption. Commercial and other non-residential uses account for the reaming 20%.
- Commercial Use Factor: Community Commercial = 1,800 gpd/acre
- Commercial Fire Flow Requirements: 3,000 gpm for two (2) hours
- Gross Per Capita Consumption: 275 gpd/capita
- Residential Consumption (excludes non residential use): 210 gpd/capita

Thee categories of storage are considered when evaluating the total storage requirements of a community:

- Regulatory Storage: Volume of storage recommend to meet peak daily demands in excess of production (approximately 30% of MDD).
- Fire Flow Storage: 3000 gpm for 2 hrs = 360,000 gal
- Emergency Storage: 50 gpd/capita x 72 hrs

Additional Sources of Information:

- The City of Paso Robles web site was used to obtain residential density (2.7 persons per residence) and population estimates.
- City Production Records: Production records for 2000-2004 were used to estimate current gross per capita consumption (245 gpd/capita) and residential consumption (196 gpd/capita).

Storage Evaluation:

Four methods were used to evaluate the total storage requirements for Chandler Ranch. Each method differs in the basis for estimating ADD and affects only regulatory storage. An explanation of each method is summarized below:

***Method A*:** This method uses 2000-2004 production data to estimate the gross per capita consumption. The figures for gross per capita consumption and estimated population of Chandler Ranch are used to calculate the estimated ADD. This method assumes that the demand distribution for the Chandler Ranch development will mirror the City's existing demand distribution.

***Method B*:** This method uses 2000-2004 production data to calculate the residential per capita consumption (estimated as 80% of gross production). The commercial consumption is estimated using the commercial use factor (per 1995 Master Plan) multiplied by the planned commercial acreage (23.2 Acres). The sum of the residential and commercial demands provide the estimated ADD.

***Method C*:** This method uses the 1995 Water Master Plan estimate for gross per capita consumption. The figures for gross per capita consumption and estimated population of Chandler Ranch are used to calculate the estimated ADD. This method assumes that the demand distribution for the Chandler Ranch development will mirror the City's existing demand distribution.

***Method D*:** This method uses the 1995 Water Master Plan estimate for residential per capita consumption. The commercial consumption is estimated using the commercial use factor (per 1995 Master Plan) multiplied by the planned commercial acreage. The sum of the residential and commercial demands provide the estimated ADD.

Method	Population[1]	Per Capita Consumption[2] (gpcd)	Commercial Consumption[3] (gal/day)	ADD (MG/day)	MDD (MG/day)	Regulatory Storage (MG)	Emergency Storage (MG)	Fire Storage (MG)	Total Volume (MG)
A	3886	245 (gross)	-	0.95	2.09	0.63	0.58	0.36	1.57
B	3886	196	41,760	0.80	1.76	0.53	0.58	0.36	1.47
C	3886	275 (gross)	-	1.07	2.35	0.75	0.58	0.36	1.69
D	3886	210	41,760	0.86	1.89	0.57	0.58	0.36	1.51

1) Chandler Ranch population estimate: 2.7 persons/dwelling unit x 1439 dwelling units = 3886 persons
2) See Methods A-D above for details
3) Commercial Consumption: 23.2 acres x 1,800 gpd/acre = 41,760gpd

Production Requirements:

Production facilities should be sized to meet max day demand over a 24-hour period. Based on this criteria the additional production capacity to exclusively serve the Chandler Ranch development project, with no contribution from existing City wells, is estimated at 1220-1630gpm.

Method	ADD (MG/day)	MDD (MG/day)	Additional Production Capacity (gpm)
A	0.95	2.09	1450
B	0.80	1.76	1220
C	1.07	2.35	1630
D	0.86	1.89	1310

Conclusion

Based on the analysis above and the criteria set forth in the City's 1995 Water Master Plan, it is the opinion of Boyle Engineering that a 1.7MG reservoir and an additional 1630-gpm of production capacity are appropriate estimates for the storage and production requirements of the Chandler Ranch Project. However, a selection of any of the methods described above would be defensible and is ultimately the decision on the City.